INL Target Development and Fabrication

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Idaho National Laboratory

INL Target Development and Fabrication

- **INL is primarily involved with development and fabrication of actinide targets for neutron capture and neutron fission cross section measurements at LANSCE.**
- **In FY05 we developed electrodeposition techniques and fabricated targets of $^{239, 240, 242}$Pu on 2 μm and 4 μm Ti foils for DANCE measurements and on large stainless foils for one-sided fission measurements.**

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- In FY 06 we are developing electrodeposition techniques to deposit actinide isotopes onto thin (6 μm), metallized, polymer films for improved DANCE and fission neutron cross section measurements.
- We fabricated and shipped to LANL two 252Cf calibration sources using the target holders designed for use in the PPAC detector.
- On a separately-funded project, we have received approval to begin work developing the reductive distillation or evaporations technique.

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- The most recent target was ^{240}Pu, DANCE target
  - 98.84% ^{240}Pu, 0.735% ^{239}Pu and 0.141% ^{241}Pu
  - Chemically purified to remove other actinide isotopes, ^{241}Am
  - Pu coated with ~100 $\mu g/cm^2$ (~0.7 μm) VYNS
  - 4 µm Ti, covered with 2 µm Ti
  - 0.887 mg ± 4.4 %

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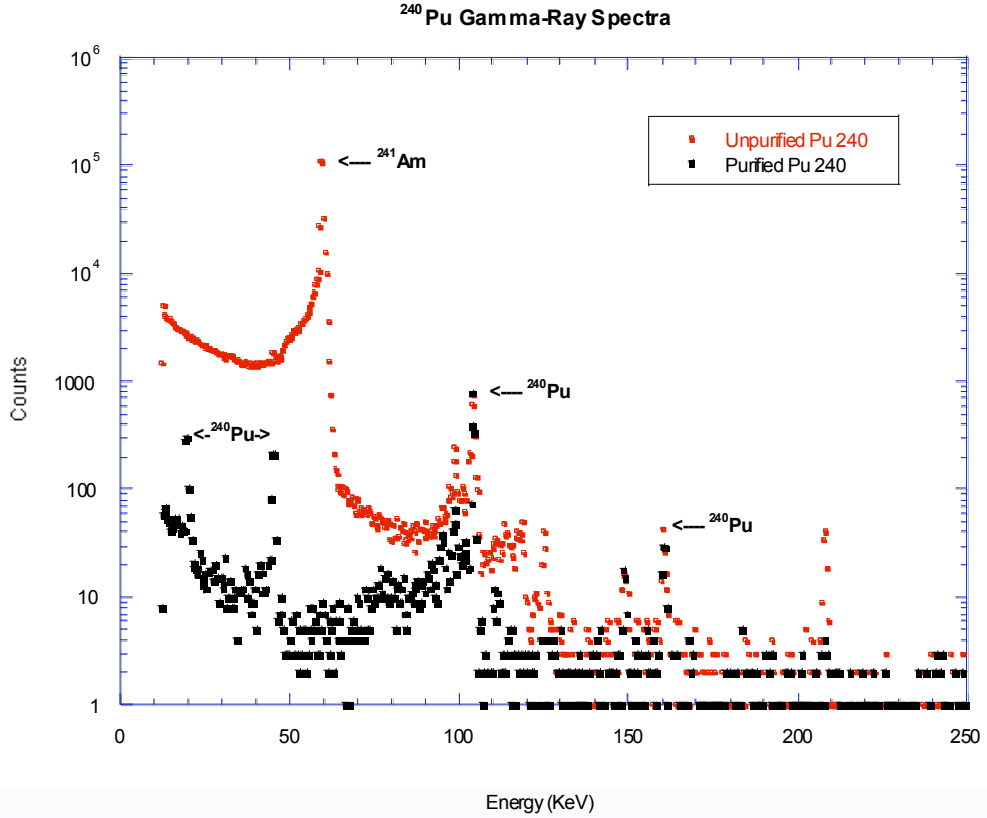

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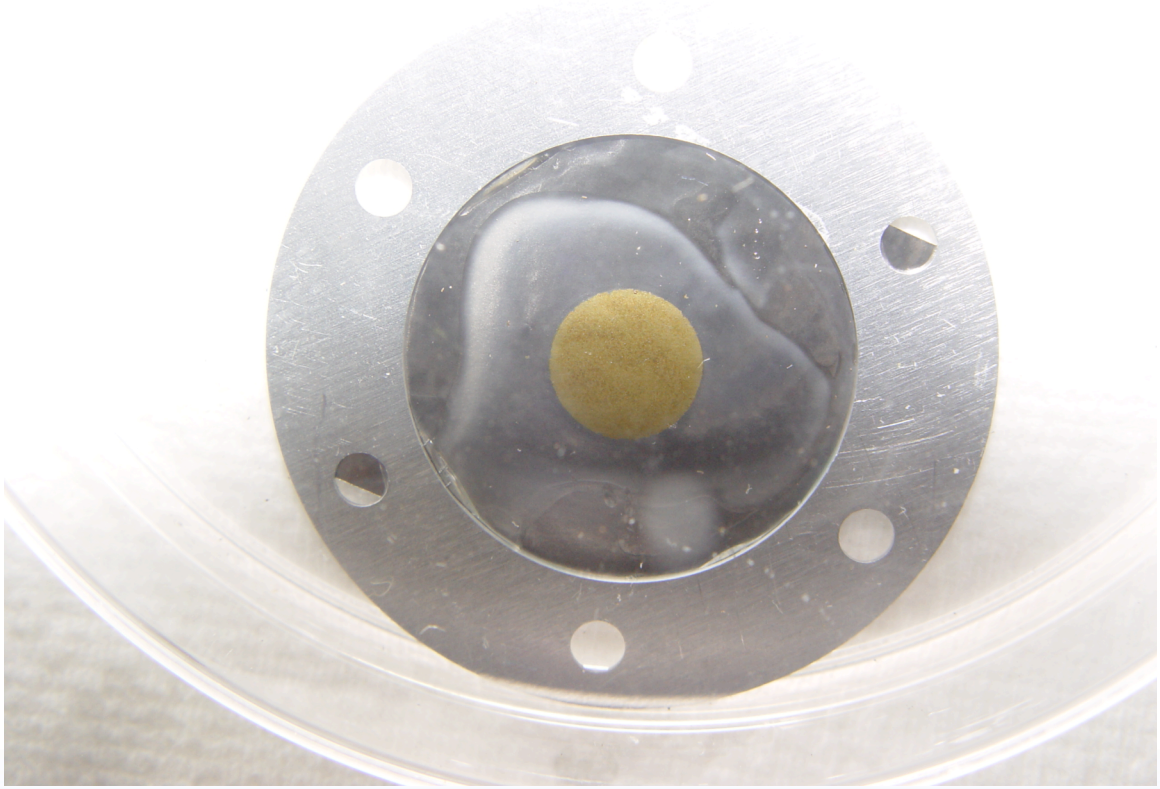

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- **Measurement Capabilities**
  - **Currently ≈ 5% accuracy**
  - **Take targets back and dissolve to improve uncertainty.**
  - **Working to develop NIST traceable calibrations for gamma-ray and alpha detectors on the order of 1-2%.**
  - **With modeling and calibration we may be able to eliminate need to return targets.**

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- **Future work -- FY06 and Beyond**
  - **Thin-film Pu-240 fission target**
  - **Pu-239, Pu-238 PPAC targets**
  - **Evaporated targets on thin films**

- We acknowledge the Office of Basic Energy Sciences, U.S. Department of Energy, through the transplutonium element production facilities at the Oak Ridge National Laboratory for the use of (these isotopes)

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